

IN THE CLAIMS

1. (Currently Amended) Method for pre-heating, transforming and melting a metal charge comprising metal scrap, in an electric arc furnace (12) associated with a tunnel (11) that transports, pre- heats and discharges said scrap, the furnace (12) comprising a hearth (13) and a roof (14) through which the electrodes (15) pass, ~~characterized in that it provides~~ comprising the steps of:

- ~~that weighing~~ the furnace (12) ~~is weighed~~ at least periodically ~~in order~~ to detect the quantity of discharged scrap present inside the furnace (12) itself;

- ~~that detecting~~ the temperature of the liquid bath inside the furnace (12) ~~is detected~~ at least periodically, and

- ~~that detecting~~ at least the discharge delivery of the scrap inside the furnace (12) ~~is detected~~ by weighing and ~~is regulated in order~~ regulating at least the discharge delivery of the scrap inside the furnace to maintain said temperature of the liquid bath around a pre-determined value.

2. (Currently Amended) Method as in claim 1, ~~characterized in that the~~ wherein electric power delivered to the furnace (12) is varied continuously from a minimum value in correspondence with ~~the~~ a first unloading step of the scrap to a maximum value in correspondence with ~~the~~ a melting step according to the quantity of scrap present inside the furnace (12) as detected by weighing the furnace (12).

3. (Currently Amended) Method as in claim 1 ~~or 2, characterized in that the~~ , wherein loading of the furnace (12) with the scrap is interrupted before tapping of ~~the~~ liquid

metal from the liquid bath for an interval of between about 8 and 12% of the overall time of the cycle.

4. (Currently Amended) Method as in ~~any claim hereinbefore, characterized in that~~ claim 1, wherein the feed of the electric power to the furnace (12) is interrupted before tapping for a time of up to 5% of the overall time of the cycle.

5. (Currently Amended) Method as in claim 2, ~~characterized in that~~ wherein said minimum value of electric power delivered is made to increase from an initial value of about 40-50% of the working value, to its maximum value.

6. (Currently Amended) Method as in ~~any claim hereinbefore, characterized in that~~ claim 2, wherein a quantity of liquid metal of around 30-40% of the overall capacity is always left in the furnace (12) ~~so as~~ to constitute a liquid reserve for the subsequent cycle.

7. (Currently Amended) Method as in ~~any claim hereinbefore, characterized in that~~ claim 2, wherein in the tapping step the electrodes (15) are at least raised from the liquid bath and the electric feed to them is interrupted.

8. (Currently Amended) Method as in ~~any claim hereinbefore, characterized in that~~ claim 2, wherein between the end of the tapping operation and the start of loading the scrap for the subsequent cycle, the electric feed to the electrodes (15) is interrupted and the following operations are carried out:

- a) the furnace (12) is rotated from the a tapping position to the a slagging position in order to interrupt the flow of liquid steel;
- b) the cleaning of the a tapping hole is controlled;
- c) the a tapping channel is filled with granular material with a high melting point;

d) the furnace is returned to ~~the~~ a horizontal position and abutments are inserted that limit the rotation to ~~the~~ reduced values during normal functioning;

e) the electrodes are enabled to descend and ~~the~~ delivery of electric power is restored.

9. (Currently Amended) Plant for pre-heating, transforming and melting a metal charge consisting of metal scrap, comprising:

a tunnel (11) ~~that transports and pre-heats~~ for transporting and pre-heating the scrap and an electric arc furnace (12),

said electric furnace (12) comprising a hearth (13) to contain the scrap and a covering roof (14) through which electrodes (15) pass, supported and moved by relative arms (16), ~~characterized in that it comprises~~

weighing means (18) to weigh said electric furnace (12),

means to detect the temperature of ~~the~~ a bath of liquid metal inside said furnace (12), and

means able to regulate the speed of unloading the scrap inside said furnace (12)

according to ~~the~~ detections made by said weighing means ~~in order~~ to keep the temperature of said bath of liquid metal around a pre-determined value.

10. (Currently Amended) Plant as in claim 9, ~~characterized in that~~ wherein said weighing means comprise load cells (18).

11. (Currently Amended) Plant as in claim 9, ~~characterized in that~~ wherein said hearth (13) is mounted on jacks (17) able to make it ~~the hearth~~ oscillate for a limited angle, comprised between $\pm 4^\circ$, during normal functioning, for example during the steps of loading, melting and refining the liquid metal, and for a greater angle, comprised between -15° and $+25^\circ$, during the steps of discharging the slag and tapping the liquid metal.

12. (Currently Amended) Plant as in claim 9, ~~characterized in that~~ wherein said hearth (13) has a shape, in relation to the inclination that ~~it~~ the hearth assumes in the step of tapping the liquid metal, ~~such as~~ to keep a liquid pool equal to about 30-40% of its capacity.

13. (Currently Amended) Plant as in claim 9, ~~characterized in that~~ wherein said transport and pre-heating tunnel (11) comprises a plurality of injection systems, wherein at least the ~~one~~ injection system nearest the electric furnace (12) has at least a burner (19) and wherein at least in a position adjacent to said burner (19) there is at least an air injector (20).

14. (Currently Amended) Plant as in ~~claims 9 and 13~~, ~~characterized in that~~ claim 9, wherein in the initial part of said tunnel (11), in a position adjacent to a pre-heated fume-outlet pipe (24), there is a compensation chamber (23) able to function as a sealing system ~~in order~~ to prevent exhaust fumes emerging from the tunnel (11) from leaking into the atmosphere.

15. (Currently Amended) Plant as in ~~any claim from 9 to 14 inclusive~~, ~~characterized in that~~ claim 9, wherein in cooperation with said transport and pre-heating tunnel (11) there is a sedimentation chamber ~~in order~~ to deposit the particulate, and the sedimentation chamber is associated with ~~which~~ a cooling tower (27) ~~is associated in order~~ to take the temperature of the fumes, entering at about 20 m/s, to about 250°C or less.

16. (New) Plant as in claim 15, wherein the fumes enter into the sedimentation chamber at about 800°C.

17. (New) Plant as in claim 15, wherein the fumes are cooled in the cooling tower at a cooling speed of not less than 250°C/sec.

18. (New) Plant as in claim 15, wherein the fumes are cooled in the cooling tower at a cooling speed of not less than 400°C/sec.